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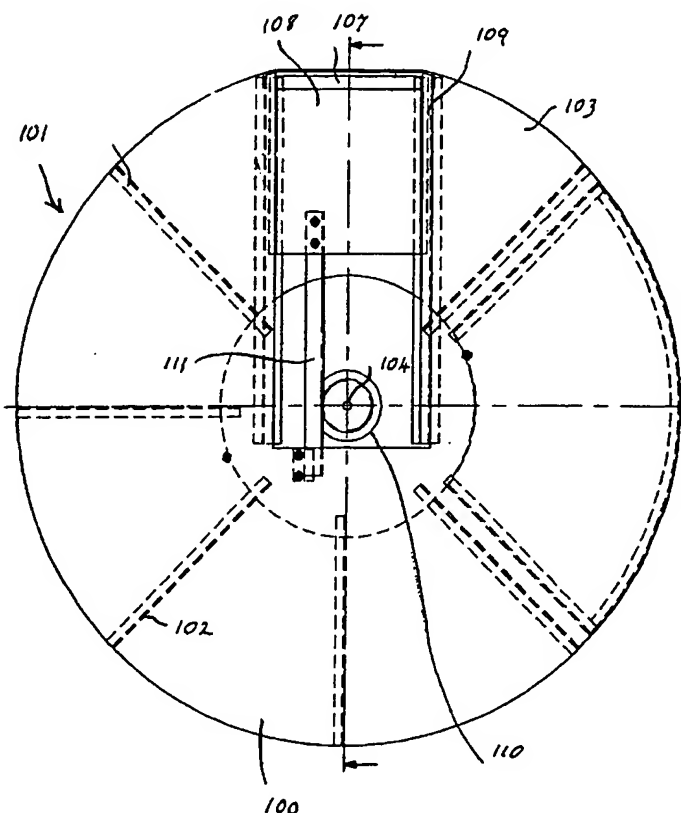
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(54) Title: HOT FOOD VENDING MACHINES



(57) Abstract: A mechanism for removing selected food containers from a carousel situated in the refrigerated food storage compartment of an automatic hot food vending machine consisting of a rotatable selector plate which forms the bottom of the carousel and which has a door in it through which selected food containers can be removed from the refrigerated food storage compartment.



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Hot Food Vending Machines

The present invention relates to vending machines for supplying hot, cooked food. Vending machines for dispensing hot foods include a refrigerated storage compartment for uncooked, or at least partially cooked, food in individual containers, an oven, which for speed in heating usually is of the microwave type, means for retrieving containers of selected foods from the refrigerated storage compartment, placing them in the oven, removing them from the oven when cooked or reheated and dispensing the cooked or reheated meals, still in the containers. Usually there is included also means for dispensing condiments appropriate to any selected meal.

The present invention relates specifically to a mechanism for retrieving the containers of food from the food storage compartment of a hot food vending machine.

Specifications EP 0 437 344, EP 0 592 255 and US 5 210 387 disclose hot food vending machines in which portions of food are held in plastic containers within cardboard sleeves. The containers and sleeves are stored in stacks in a refrigerated compartment from the top of which a selected container is removed vertically via a hole in a selector plate. The selected food container is placed on a conveyor and transported to a loading station at which the container is loaded into an oven by means of a ram which passes through the sleeve and is then withdrawn. After the food cooking cycle has been completed, the hot food container is withdrawn from the oven by a rake which also causes the food container to re-enter the sleeve before being conveyed to a dispensing station.

Specification US 5,210,387 discloses a hot food vending machine which, among other features, includes a

refrigerated compartment for the storage of pre-packed food to be dispensed by the machine. In the refrigerated compartment there is a number of vertical stacks for food containers. Across the top of the food container stacks  
5 there is an apertured and a mechanism for removing a selected food container from the refrigerated compartment and delivering it to an oven for cooking or heating. Each of the vertical stacks for food containers includes a mechanically operated mechanism which raises a  
10 container of a selected food to the level of the apertured plate whence it is picked up by a transfer mechanism and moved to a cooking point. The whole mechanism is cumbersome and complicated, involving as it does, chain drives, lead screw drives and pneumatic  
15 mechanisms. Moreover, there is a tendency for the food containers to be stuck together by ice, which has to be overcome by the container picker and transfer mechanism.

It is an object of the present invention to provide an  
20 improved apparatus for removing food containers from a refrigerated storage compartment forming part of an automatic hot food vending machine.

According to the present invention there is provided  
25 an apparatus for selectively removing packaged foodstuffs from a refrigerated storage compartment forming part of an automatic hot food vending machine, comprising a carousel having a plurality of compartments for food containers, a rotatable selector plate forming the bottom  
30 of the carousel, a door in the selector plate of a size sufficient to allow the passage of a food container therethrough, means responsive to a customer operated food selector to rotate the selector plate to a position such that the door in the selector plate is located  
35 within a compartment of the carousel containing that food, means for opening the door in the selector plate

when it is in an appropriate position so as to permit a food container filled with that food to pass through the door in the selector plate into a receptacle for conveyance to a delivery hatch also in the refrigerated  
5 compartment.

Preferably, there is included an elevator table adapted to receive the food container and lower it through a delivery hatch in the bottom of the  
10 refrigerated storage compartment in which the carousel is situated and the selector plate includes an insulated portion which, after the elevator table has been lowered to remove the food container from the refrigerated storage compartment, is positioned to cover the delivery  
15 hatch in the bottom of the refrigerated storage compartment.

The invention will now be described, by way of example, with reference to the accompanying drawings, in  
20 which

Figure 1 is a plan view of an embodiment of the drawings; and

25 Figure 2 is a part sectioned elevation of the embodiment of the invention.

Referring to Figures 1 and 2, a selector plate 100 forms the bottom of a carousel 101, only a portion of  
30 which is shown. The carousel 101 has a number of regularly spaced longitudinal vanes 102 which form compartments 103 for standardised pre-packed containers for food to be dispensed from an automatic hot food vending machine of which the carousel forms part. The  
35 remainder of the machine is not shown in the drawing.

The selector plate 100 is mounted on an axle 104 and can be rotated via an electric motor 105 and chain drive system 106 and has formed in it a hole 107 of a size sufficient to allow the passage of a food container 5 through it, which is closed by a sliding door 108. The door 108 is moved in runners 109 by a rack and pinion mechanism 110, 111. The hole 107 in the selector plate 100 has downwardly extending walls 112 which form a receptacle 113 for a selected food container which has 10 passed through the hole 107 in the selector plate 100. The bottom of the receptacle 113 is formed by the top surface of an insulated base member 114 of a refrigerated storage compartment of the vending machine in which the carousel 100 is situated. The base member 114 of the 15 storage compartment has a delivery hatch 115 formed in it. A vertically moveable table 116 which forms part of a mechanism for delivering food containers to an oven unit (not shown) is situated in the delivery hatch 115. Normally the table 116 is positioned with its upper 20 surface approximately flush with the top surface 114 of the base member 114 of the refrigerated storage compartment.

In use, the selector plate 100 is rotated in 25 response to signals from a customer operated food selector pad on the casing of the vending machine until the door 108 is situated about twenty degrees before the compartment 103 of the carousel 100 in which containers with the appropriate food in them are stored. The door 30 108 is then opened, the continued rotation of the selector plate 100 allowing the bottom food container to pass through into the receptacle 113 when the door aperture and compartment 103 of the carousel are in juxtaposition. The selector plate 100 is rotated further 35 until the food container is positioned upon the table 116. The table 116 is then lowered through the base

member 114 of the storage compartment, to remove the food container therefrom prior to its delivery to the oven for the heating or cooking of the food contained within it.

- 5        After the table 116 has been lowered to its delivery position the door 108 is closed and the selector plate 100 is rotated by a further amount so as to bring an insulated portion (not shown in the drawing) into juxtaposition with the delivery hatch 115 so as to  
10 minimise the heat loss through the delivery hatch 115.

15        The positioning of the selector plate 100 is controlled by markings on an index plate 117 positioned below the selector plate 100 outside the base member 114 of the freezer cabinet, which are read by an optical  
sensor (not shown in the drawing) and relayed to a central machine controller (also not shown in the drawing).

- 20        Alternatively, the positioning of the selector plate 100 could be controlled by limit switches, a direct stepping motor and controller, a Genera drive mechanism, or other suitable mechanism.

- 25        In order to facilitate the re-loading of the carousel, it too is rotatable about the same axis as the selector plate 100.

30        The invention has a number of advantages over the food storage system disclosed in specification US 5,210,387, among which are:

- a)    The reduction of moving parts which are situated in the refrigerated compartment.

b) The continual motion of the selector plate tends to agitate the stacks of food containers, so reducing any tendency for the food containers to stick together, particularly in the case of the less popular  
5 items which may be stored for an appreciable period of time before use, and

c) gravity aids the separation of selected food containers from the respective stack of food containers.

Claims

1. An apparatus for selectively removing packaged  
foodstuffs from a refrigerated storage compartment  
5 forming part of an automatic hot food vending machine,  
comprising a carousel having a plurality of compartments  
for food containers, a rotatable selector plate forming  
the bottom of the carousel, a door in the selector plate  
of a size sufficient to allow the passage of a food  
10 container therethrough, means responsive to a customer  
operated food selector to rotate the selector plate to a  
position such that the door in the selector plate is  
located within a compartment of the carousel containing  
that food, means for opening the door in the selector  
15 plate when it is in an appropriate position so as to  
permit a food container filled with that food to pass  
through the door in the selector plate into a receptacle  
for conveyance to a delivery hatch in the refrigerated  
compartment.

20

2. An apparatus according to claim 1 wherein the  
receptacle is formed by downwardly projecting walls of  
the door aperture and the top surface of the bottom of  
the refrigerated compartment.

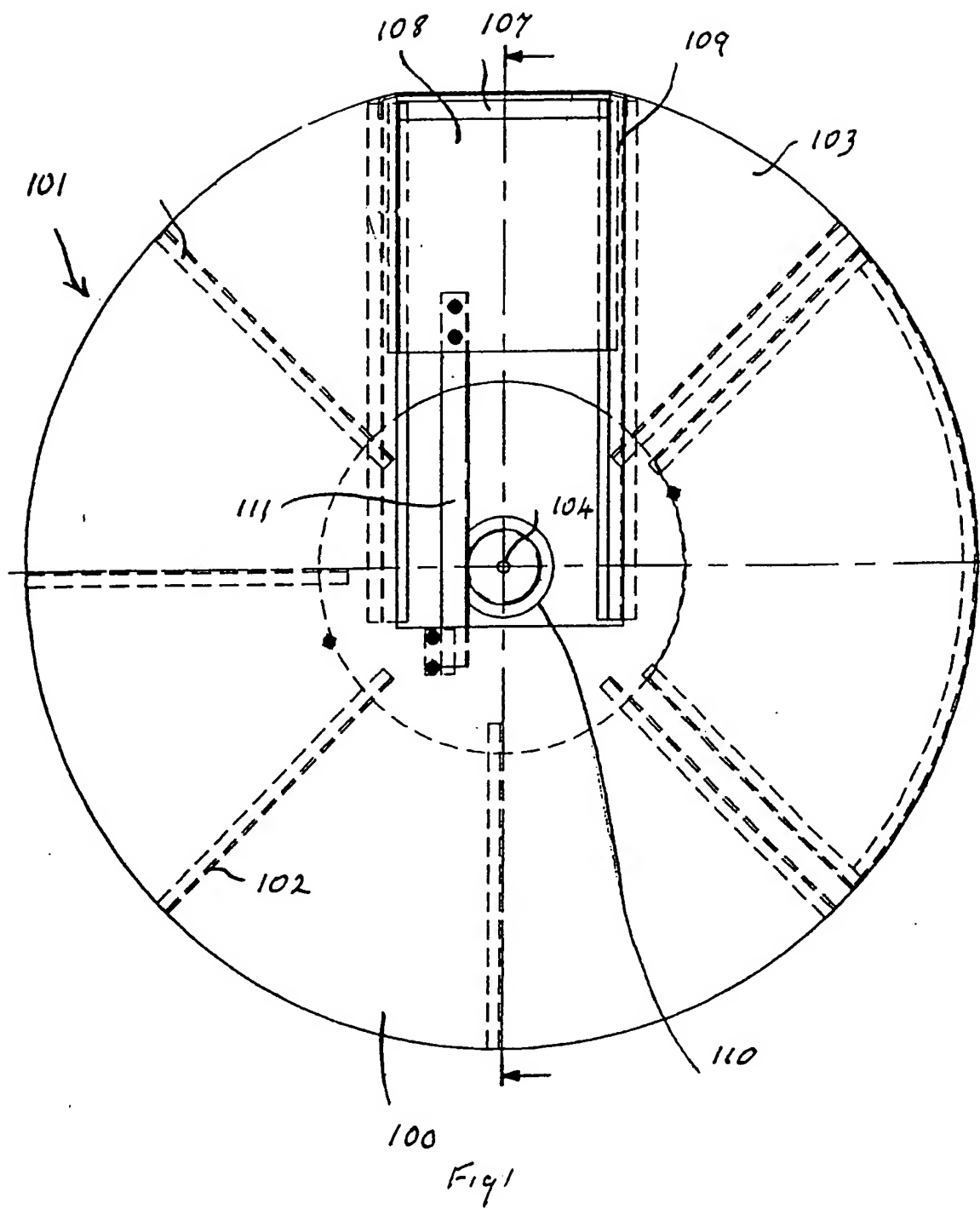
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3. An apparatus according to claim 2 wherein the  
delivery hatch is formed in the bottom of the  
refrigerated compartment and there is included a  
vertically moveable table situated in the delivery hatch  
30 and adapted to receive a food container from the  
receptacle and lower it through the bottom of the  
refrigerated compartment for onward transport to an oven  
loading station forming part of the hot food vending  
machine.

35



4. An apparatus according to any of claims 1 to 3  
wherein the selector plate includes a thermally insulated  
portion and there is included means for positioning that  
portion of the selector plate above the delivery hatch  
5 during those periods when no demands for the delivery of  
food containers occurs.
5. An apparatus according to any preceding claim  
wherein the carousel is rotatable about the same axis as  
10 the selector plate thereby to facilitate the re-stocking  
of the carousel.
6. An apparatus for selectively removing food  
containers from a refrigerated compartment forming part  
15 of an automatic hot food vending machine substantially as  
hereinbefore described and with reference to the  
accompanying drawings.



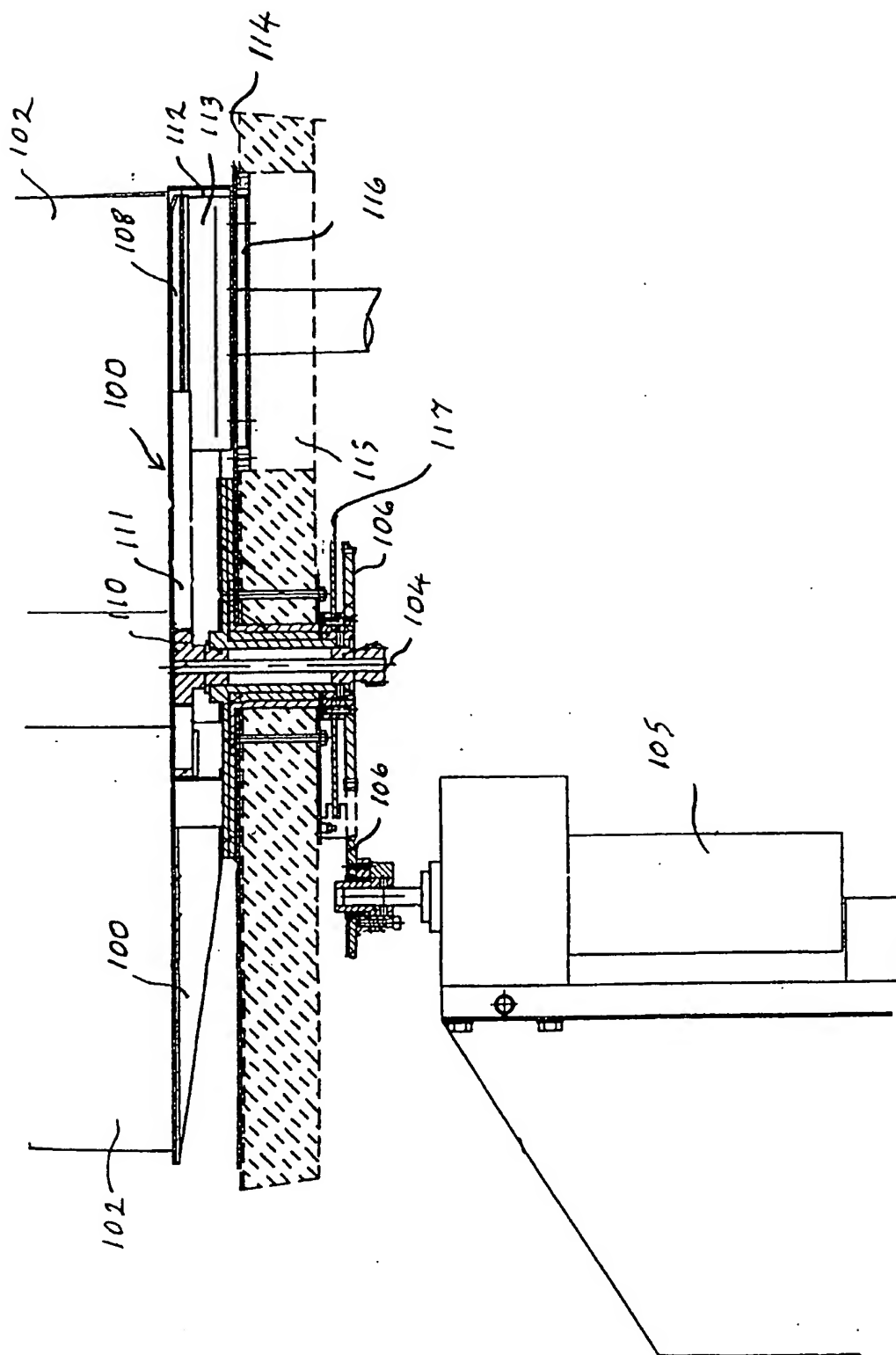


Fig 2

# INTERNATIONAL SEARCH REPORT

Application No  
PCT/G8 00/02486

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G07F11/54 G07F9/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

COMPENDEX, EPO-Internal, INSPEC, PAJ, IBM-TDB, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 522 310 A (BLACK SR GARY W ET AL) 4 June 1996 (1996-06-04) column 4, line 58 -column 5, line 13 column 6, line 17 -column 6, line 46 column 7, line 10 -column 7, line 32 column 8, line 11 -column 8, line 34 column 8, line 56 -column 9, line 31; figures 1,2,3,4,5A,5B,5C	1,2
A	NL 8 801 951 A (FRI JADO BV) 1 March 1990 (1990-03-01) page 3, line 38 -page 4, line 34; figure 1	1,3
A	US 5 144 879 A (ALESSI MARION) 8 September 1992 (1992-09-08) column 5, line 31 -column 6, line 12 column 7, line 10 -column 8, line 3; figures 1-4,5A-5F	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

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"&" document member of the same patent family

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

Application No

PCT/GB 00/02486

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